

CITY OF SAN BRUNO

WATER EFFICIENT

LANDSCAPE AND IRRIGATION

GUIDELINES

WATER EFFICIENT LANDSCAPE AND IRRIGATION GUIDELINES

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I. INTRODUCTION

A. GENERAL

The efficient use of water has become a very important element in the management of water resources in the City of San Bruno and throughout the State of California. The recent dry periods, a rapidly growing population, and limited water supplies have put a tremendous demand on one of California's most precious resources. These factors have forced the State and local water agencies to adopt water conservation measures and legislation.

In 1990, State Legislators passed Assembly Bill No. 325: The Water Conservation and Landscaping Act. In response to AB 325, the City of San Bruno has prepared these *Water Efficient Landscape and Irrigation Guidelines* modeled after the state ordinance.

B. PURPOSE

The purpose of these Water Efficient Landscape and Irrigation Guidelines is to effect efficient water use through proper landscape design and management.

C. CLIMATIC CONDITIONS

San Bruno's climate is affected by both coastal and bayside weather influences. The coastal mountains partially protect San Bruno from coastal weather although the City's hilly neighborhoods experience seasonal fog and wind. The lower elevations generally have milder conditions with some maritime influences from the Bay. A temperature inversion, where warm dry air overrides cool marine air and traps air pollutants close to the ground, often occurs during late summer and fall.

San Bruno averages 290 sunny days a year. Temperatures range from 50 to 80 degrees F. in the summer and 36-65 degrees F. in the winter. The average precipitation rate is 19.53 inches a year. The estimated evapotranspiration rate (ET_o) is 38.25 inches a year.

II. DEFINITIONS

The words used in these guidelines have the meaning set forth below:

(a) **"anti-drain valve" or "check valve"** means a valve located under a sprinkler head to hold water in the system so it minimizes drainage from the lower elevation sprinkler heads.

(b) **"application rate"** means the depth of water applied to a given area, usually measured in inches per hour.

(c) **"applied water"** means the portion of water supplied by the irrigation system to the landscape.

(d) **"automatic controller"** means a mechanical or solid state timer, capable of operating valve stations to set the days and length of time of a water application.

(e) **"backflow prevention device"** means a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.

(f) **"conversion factor (0.62)"** means a number that converts the maximum applied water allowance from acre-inches per acre per year to gallons per square foot per year. The conversion factor is calculated as follows:

$$\begin{aligned} (325,851 \text{ gallons} / 43,560 \text{ square feet}) / 12 \text{ inches} &= (0.62) \\ 325,851 \text{ gallons} &= \text{one acre foot} \\ 43,560 \text{ square feet} &= \text{one acre} \\ 12 \text{ inches} &= \text{one foot} \end{aligned}$$

To convert gallons per year to 100 cubic feet per year, another common billing unit for water, divide gallons per year by 748. (748 gallons = 100 cubic feet).

(g) **"ecological restoration project"** means a project where the site is intentionally altered to establish a defined, indigenous, historic ecosystem.

(h) **"effective precipitation" or "usable rainfall"** mean the portion of total precipitation that is used by the plants. Precipitation is not a reliable source of water, but can contribute to some degree toward the water needs of the landscape.

(i) **"emitter"** means drip irrigation fittings that deliver water slowly from the system to the soil.

(j) **"established landscape"** means the point at which plants in the landscape have developed roots into the soil adjacent to the root ball.

(k) **"establishment period"** means the first year after installing the plant in the landscape.

(l) **"Estimated Applied Water Use"** means the portion of the Estimated Total Water Use that is derived from applied water. The Estimated Applied Water Use shall not exceed the Maximum Applied Water Allowance. The Estimated Applied Water Use may be the sum of the water recommended through the irrigation schedule, as referenced in Section III (c) (3).

(m) **"Estimated Total Water Use"** means the annual total amount of water estimated to be needed to keep the plants in the landscaped area healthy. It is based upon such factors as the local evapotranspiration rate, the size of the landscaped area, the types of plants, and the efficiency of the irrigation system, as described in Section III (c) (4).

(n) **"ET adjustment factor"** means a factor of 0.8, that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape.

A combined plant mix with a site-wide average of 0.5 is the basis of the plant factor portion of this calculation. The irrigation efficiency for purposes of the ET Adjustment Factor is 0.625. Therefore, the ET Adjustment Factor $(0.8) = (0.5/0.625)$.

(o) **"evapotranspiration"** means the quantity of water evaporated from adjacent soil surfaces and transpired by plants during a specific time.

(p) **"flow rate"** means the rate at which water flows through pipes and valves (gallons per minute or cubic feet per second).

(q) **"hydrozone"** means a portion of the landscaped area having plants with similar water needs that are served by a valve or set of valves with the same schedule. A hydrozone may be irrigated or nonirrigated. For example, a naturalized area

planted with native vegetation that will not need supplemental irrigation once established is a non-irrigated hydrozone.

(r)"infiltration rate" means the rate of water entry into the soil expressed as a depth of water per unit of time (inches per hour).

(s)"irrigation efficiency" means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum irrigation efficiency for purposes of these guidelines is 0.625. Greater irrigation efficiency can be expected from well designed and maintained systems.

(t)"landscape irrigation audit" means a process to perform site inspections, evaluate irrigation systems, and develop efficient irrigation schedules.

(u) "landscaped area" means the entire parcel less the building footprint, driveways, non-irrigated portions of parking lots, hardscapes - such as decks and patios, and other non-porous areas. Water features are included in the calculation of the landscaped area. Areas dedicated to edible plants, such as orchards or vegetable gardens are not included.

(v)"lateral line" means the water delivery pipeline that supplies water to the emitters or sprinklers from the valve.

(w)"main line" means the pressurized pipeline that delivers water from the water source to the valve or outlet.

(x)"Maximum Applied Water Allowance" means, for design purposes, the upper limit of annual applied water for the established landscaped area as specified in Section III (c) (2). It is based upon the area's reference evapotranspiration, the ET Adjustment Factor, and the size of the landscaped area. The Estimated Applied Water Use shall not exceed the Maximum Applied Water Allowance .

(y)"mulch" means any material such as leaves, bark, straw or other materials left loose and applied to the soil surface for the beneficial purpose of reducing evaporation.

(z)"operating pressure" means the pressure at which a system of sprinklers is designed to operate, usually indicated at the base of a sprinkler.

(aa) **"overhead sprinkler irrigation systems"** means those with high flow rates (pop-ups, impulse sprinklers, rotors, etc).

(bb) **"overspray"** means the water which is delivered beyond the landscaped area, wetting pavements, walks, structures; or other non-landscaped areas.

(cc) **"plant factor"** means a factor that when multiplied by reference evapotranspiration, estimates the amount of water used by plants.

For purposes of these guidelines, the average plant factor of low water using plants ranges from 0 to 0.3, for average water using plants the range is 0.4 to 0.6, and for high water using plants the range is 0.7 to 1.0.

(dd) **"rain sensing device"** means a device which automatically shuts off the irrigation system when it rains.

(ee) **"record drawing" or "as-builts"** means a set of reproducible drawings which show significant changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the contractor.

(ff) **"recreational area"** means areas of active play or recreation such as sports fields, school yards, picnic grounds, or other areas with intense foot traffic.

(gg) **"recycled water", "reclaimed water", or "treated sewage effluent water"** means treated or recycled waste water of a quality suitable for nonpotable uses such as landscape irrigation; not intended for human consumption.

(hh) **"reference evapotranspiration" or "ETo"** means a standard measurement of environmental parameters which affect the water use of plants. ETo is given in inches per day, month, or year as represented in Exhibit "D" and is an estimate of the evapotranspiration of a large field of four to seven inch tall, cool season grass that is well watered. Reference evapotranspiration is used as the basis of determining the Maximum Applied Water Allowances so that regional differences in climate can be accommodated. Reference evapotranspiration (ETo) for the City of San Bruno is estimated to be 38,25 inches per year. This figure is obtained by taking the average ETo value between Half Moon Bay and Redwood City as provided in Exhibit "D".

(ii) **"rehabilitated landscape"** means any relandscaping project that requires a permit from the City of San Bruno.

(jj) **"run off"** means water which is not absorbed by the soil or landscape to which it is applied and flows from the area. For example, run off may result from water that is applied at too great a rate (application rate exceeds infiltration rate) or when there is a severe slope.

(kk) **"soil moisture sensing device"** means a device that measures the amount of water in the soil.

(ll) **"soil texture"** means the classification of soil based on the percentage of sand, silt, and clay in the soil.

(mm) **"sprinkler head"** means a device which sprays water through a nozzle.

(nn) **"static water pressure"** means the pipeline or municipal water supply pressure when water is not flowing.

(oo) **"station"** means an area served by one valve or by a set of valves that operate simultaneously.

(pp) **"turf"** means a surface layer of earth containing mowed grass with its roots. Annual bluegrass, Kentucky bluegrass, Perennial rye grass, Red fescue, and Tall fescue are cool season grasses. Bermuda grass, Kikuyu grass, Seashore paspalum, St. Augustine grass, zoysia grass, and Buffalo grass are warm-season grasses.

(qq) **"valve"** means a device used to control the flow of water in the irrigation system.

(rr) **"water conservation concept statement"** means a one page checklist and a narrative summary of the project as shown in Exhibit "A".

III. PROVISIONS FOR NEW OR REHABILITATED LANDSCAPES

A. APPLICABILITY

1. Except as provided in Section III. A.2. this section shall apply to:

(a) all new and rehabilitated landscaping for public agency projects and private development projects that require a permit from the City of San Bruno; and

(b) developer-installed landscaping in single family and multi-family townhome, condominium and apartment projects over four (4) dwelling units.

2. This section shall not apply to:

(a) homeowner provided landscaping at single family detached dwellings or multi family townhome, condominium, and apartment projects of four (4) dwelling units or less;

(b) cemeteries;

(c) registered historical sites;

(d) ecological restoration projects that do not require a permanent irrigation system;

(e) any project with a landscaped area less than 2,500 square feet;

(f) public school district properties.

B. LANDSCAPE DOCUMENTATION PACKAGE

1. Three (3) copies of the landscape documentation package conforming to this section shall be submitted to the San Bruno Planning and Building Department. No landscaping shall be installed until the city reviews and approves the landscape documentation package.

2. Two (2) copies of the approved landscape documentation package shall be returned to the property owner/applicant.

3. Upon completion, a copy of the Certificate of Substantial Completion shall be sent by the property owner/applicant to the San Bruno Planning and Building Department.

4. Each landscape documentation package shall include the following elements, which are described in Section III.C.:

- (a) Water Conservation Concept Statement
- (b) Calculation of the Maximum Applied Water Allowance
- (c) Calculation of the Estimated Applied Water Use
- (d) Calculation of the Estimated Total Water use
- (e) Landscape Design Plan
- (f) Irrigation Design Plan
- (g) Irrigation Schedules
- (h) Grading Design Plan
- (i) Soil Analysis
- (j) Maintenance Schedule
- (k) Effective Precipitation Disclosure Statement
- (l) Landscape Irrigation Audit
- (m) Certificate of Substantial Completion. (To be submitted after installation of the project).

C. ELEMENTS OF LANDSCAPE DOCUMENTATION PACKAGE

1. Water Conservation Concept Statement

Each landscape documentation package shall include a cover sheet, referred to as the Water Conservation Concept Statement similar to Exhibit "A" attached. It serves as a check list to verify that the elements of the landscape documentation package have been completed and as a narrative summary of the project.

2. Maximum Applied Water Allowance

(a) A project's Maximum Applied Water Allowance shall be calculated using the following formula:

$MAWA = (ET_o) (0.8) (LA) (0.62)$ where:

MAWA =Maximum Applied Water Allowance (gallons per year)

ET_o =Reference Evapotranspiration (inches per year)

0.8 =ET Adjustment Factor

LA =Landscaped Area (square feet)

0.62 =conversion factor (to gallons per sq. ft.)

An example calculation of the Maximum Applied Water Allowance in the City of San Bruno is:

Landscaped area of 50,000 sq. ft. in San Bruno:

$MAWA = (ET_o) (.8) (LA) (.62)$

$= (38.25 \text{ inches}) (.8) (50,000 \text{ square feet}) (.62)$

Maximum Applied Water Allowance = 948,600 gallons per year, or

(1,268 hundred cubic feet per year: $948,600 / 748 = 1,268$)

(b) Portions of landscaped areas in public and private projects such as parks, playgrounds, sports fields, golf courses, or school yards where turf provides a playing surface or serves other recreational purposes are considered recreational areas and may require water in addition to the Maximum Applied Water Allowance. A statement shall be included with the landscape design plan, designating recreational areas to be used for such purposes and specifying any needed amount of additional water above the Maximum Applied Water Allowance.

(c) Other landscape areas requiring water in addition to the Maximum Applied Water Allowance may be considered by the City of San Bruno on a case-by-case basis for determining if additional water is warranted. A statement shall be included with the landscape design plan designating such areas and specifying any needed amount of additional water above the Maximum Applied Water Allowance.

3. Estimated Applied Water Use

(a) The Estimated Applied Water Use shall not exceed the Maximum Applied Water Allowance, unless exceptions are granted by the City of San Bruno.

(b) A calculation of the Estimated Applied Water Use shall be submitted with the Landscape Documentation Package. It may be calculated by summing the amount of water recommended in the irrigation schedule.

4. Estimated Total Water Use

(a) A calculation of the Estimated Total Water Use shall be submitted with the Landscape Documentation Package. The Estimated Total Water Use may be calculated by summing the amount of water recommended in the irrigation schedule and adding any amount of water expected from effective precipitation (not to exceed 25 percent of the local annual mean

precipitation) or may be calculated from a formula such as the following:

The Estimated Total Water Use for the entire landscaped area equals the sum of the Estimated Water use of all hydrozones in that landscaped area.

$$\text{EWU (hydrozone)} = \frac{(\text{ETo}) (\text{PF}) (\text{HA}) (.62)}{(\text{IE})}$$

EWU (hydrozone) = (Estimated Water Use (gallons per year)

ETo = Reference Evapotranspiration (inches per year)

PF = plant factor

HA = hydrozone area (square feet)

(.62) = conversion factor

IE = irrigation efficiency

(b) - If the Estimated Total Water Use is greater than the Estimated Applied Water Use due to precipitation being included as a source of water, an Effective Precipitation Disclosure Statement similar to Exhibit "D" shall be included in the Landscape Documentation Package.

5. Landscape Design Plan

A landscape design plan meeting the following requirements shall be submitted as part of the landscape documentation package. NOTE: All applicable landscape provisions of the San Bruno Zoning Ordinance shall be complied with in the design of the landscape plan.

(a) Plant Selection and Grouping

(i) Any combination of plant species may be used in the landscape plan, providing the Estimated Applied Water Use recommended does not exceed the Maximum Applied Water Allowance and that the plants meet the specifications set forth in (ii), (iii), (iv), and (v). It is recommended that water conserving plant materials be utilized where appropriate. A source list of various publications pertaining to water conserving plants is attached as Exhibit "E".

(ii) Plants having similar water use shall be grouped together in distinct hydrozones.

(iii) Plants shall be selected appropriately based upon their adaptability to the climatic, geologic, and topographical conditions of the site. Protection and preservation of native species and natural areas is a priority.

(iv) Plant species selection and placement shall be designated to avoid sight visibility obstruction within parking lots, at driveway entrances/exits, and on street corners.

(v) Fire prevention needs shall be addressed in areas that are fire prone. Information about fire prone areas and appropriate landscaping for fire safety is available from the San Bruno Fire Department or the California Department of Forestry.

(b) Water Features

(i) Recirculating water shall be used for decorative water features.

(ii) All water features shall be included in the calculation of landscaped areas, for the purposes of determining the maximum applied water allowance.

(iii) Pool and spa covers are strongly encouraged.

(c) Landscape Design Plan Specifications

The landscape design plan shall be drawn on project base sheets at a scale (appropriately chosen for the site size) that accurately and clearly identifies:

(i) Designation of hydrozones.

(ii) Landscape materials, trees, shrubs, groundcover, turf, and other vegetation. Planting symbols shall be clearly drawn and plants labeled by botanical name, common name, container size, spacing, and quantities of each group of plants indicated. A table containing this information shall be provided on the plans.

(iii) Property lines and street names.

(iv) Streets, driveways, walkways, and, other paved areas.

(v) Pools, ponds, water features, fences, and retaining walls.

(vi) Existing and proposed buildings and structures including elevations if applicable.

(vii) Natural features including but not limited to rock outcroppings, existing trees, shrubs that will remain or are proposed to be removed.

(viii) Tree staking, plant installation, soil preparation details, and any other applicable planting and installation details.

(ix) A calculation of the total landscaped area by hydrozones.

(x) Designation of recreational areas.

(xi) Location of all utility lines (electrical, gas, phone, cable, water, and sewer), utility boxes and meters, and fire hydrants.

6. Irrigation Design Plan

An irrigation design plan meeting the following conditions shall be submitted as part of the Landscape Documentation Package.

(a) Irrigation Design Criteria

(i) Runoff and Overspray. Soil types and infiltration rate shall be considered when designing irrigation systems. All irrigation systems shall be designed to avoid runoff, low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, or structures. Proper irrigation equipment and schedules, including features such as repeat cycles, shall be used to closely match application rates to infiltration rates therefore minimizing runoff.

Special attention shall be given to avoid runoff on slopes and to avoid overspray in planting areas with a width less than ten feet, and in median strips.

Overhead sprinkler irrigation systems should be avoided in median strips less than ten feet wide.

(ii) Irrigation Efficiency. For the purpose of determining the maximum applied water allowance, irrigation efficiency is assumed to be 0.625. Irrigation systems shall be designed, maintained, and managed to meet or exceed 0.625 efficiency.

(iii) Equipment.

Water meters. Separate landscape water meters shall be installed for all projects except for single family homes or any project with a landscaped area of less than 5,000 square feet.

Controllers. Automatic control systems shall be required for all irrigation systems and must be able to accommodate all aspects of the design.

Valves. Plants which require different amounts of water shall be irrigated by separate valves. If one valve is used for a given area, only plants with similar water use shall be used in that area. Anti-drain (check) valves shall be installed in strategic points to minimize or prevent low-head drainage.

Sprinkler heads. Heads and emitters shall have consistent application rates within each control valve circuit. Sprinkler heads shall be selected for proper area coverage, application rate, operating pressure, adjustment capability, and ease of maintenance.

Rain Sensing Override Devices. Rain sensing override devices for irrigation systems are recommended for landscape areas over 5,000 square feet in area.

Soil Moisture Sensing Devices. Soil moisture sensing devices for irrigation systems are recommended for landscape areas over 5,000 square feet in area.

(b) Recycled Water

(i) If in the future recycled water meeting all health standards is made readily available in San Bruno, irrigation systems may be designed to make use of recycled water in accordance with all local and state codes.

(c) Irrigation Design Plan Specifications

Irrigation systems shall be designed to be consistent with hydrozones.

The irrigation design plan shall be drawn on project base sheets. It shall be separate from, but use the same format as, the landscape design plan. The scale shall be the same as that used for the landscape design plan.

The irrigation design plan shall accurately and clearly identify:

(i) Location and size of separate water meters for the landscape.

(ii) Location, type, and size of all components of the irrigation system, including automatic controllers, main and lateral lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, and backflow prevention devices.

(iii) Static water pressure at the point of connection to the public water supply.

(iv) Flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (psi) for each station.

7. Irrigation Schedules

Irrigation schedules satisfying the following conditions shall be submitted as part of the Landscape Documentation Package.

(a) An annual irrigation program with monthly irrigation schedules shall be required for the plant establishment period, for the established landscape, and for any temporarily irrigated areas.

(b) The irrigation schedule shall:

(i) include run time (in minutes per cycle), suggested number of cycles per day, and frequency of irrigation for each station; and

(ii) provide the amount of applied water (in hundred cubic feet and gallons) recommended on a monthly and annual basis.

(c) The total amount of water for the project shall include water designated in the Estimated Total Water Use calculation plus water needed for any water features, which shall be considered as a high water using hydrozone.

(d) Recreational areas designated in the landscape design plan shall be highlighted and the irrigation schedule shall indicate whether any additional water is needed above the Maximum Applied Water Allowance because of high plant factors (but not due to irrigation inefficiency).

(e) Irrigation scheduling should incorporate the use of evapotranspiration data from the California Irrigation Management Information System (CIMIS) weather stations to apply the appropriate levels of water for different months of the year.

(f) Landscape irrigation should be scheduled between 2:00 A.M. and 10:00. A.M.. to avoid irrigating during times of high wind or high temperature.

8. Grading Design Plan

Grading design plans satisfying the following conditions shall be submitted as part of the Landscape Documentation Package.

(a) A grading design plan shall be drawn on separate project base sheets or incorporated into the landscape design plan. If drawn separate it shall use the same format as the landscape design plan.

(b) The grading design plan shall indicate finished configurations and elevations of the landscaped area, including the height of graded slopes, drainage patterns, pad elevations, and finish grade.

9. Soils Analysis

(a) A soil analysis satisfying the following conditions shall be submitted as part of the Landscape Documentation Package.

(i) Determination of soil texture, indicating the percentage of organic matter.

(ii) An approximate soil infiltration rate (either measured or derived from soil texture/ infiltration rate tables). A range of infiltration rates shall be noted where appropriate.

(iii) Measure of pH, and total soluble salts.

(b) A mulch of up to three inches deep should be applied to all planting areas except turf.

10. Maintenance Schedules

A regular maintenance schedule satisfying the following conditions shall be submitted as part of the Landscape Documentation Package.

(a) Landscapes shall be maintained to ensure water efficiency. A regular maintenance schedule shall include but not be limited to checking, adjusting and repairing irrigation equipment; resetting the automatic controller; aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning, and weeding in all landscaped areas.

(b) Whenever possible, repair of irrigation equipment shall be done with the originally specified materials or their equivalents.

11. Effective Precipitation Disclosure statement

If effective precipitation is included in the calculation of the Estimated total Water Use, an Effective Precipitation Disclosure Statement shall be completed, signed, and submitted with the Landscape Documentation Package. A sample Effective Precipitation disclosure Statement is attached as Exhibit "B". No more than 25 percent of the local annual mean precipitation shall be considered effective precipitation in the calculation of the Estimated Total Water Use. The Effective Precipitation rate for San Bruno shall be 4.88 inches, which is 25% of 19.53 inches per year.

12. Landscape Irrigation Audit

(a) A landscape irrigation audit shall be completed for all projects except single family residences and multi-family townhome, condominium, and apartment projects of four (4) units or less.

(b) Audits shall follow the State of California Landscape Water Management Program as described in the Landscape

Irrigation Auditor Handbook, the entire document, which is hereby incorporated by reference. (See Landscape Irrigation Auditor Handbook (June 1990) version 5.5 (formerly Master Auditor Training)).

(c) A landscape irrigation audit shall be conducted by a certified landscape irrigation auditor upon completion of installation of the landscaping and the irrigation system.

13. Certification of Substantial Completion

(a) Upon completing the installation of the landscaping and the irrigation system, an irrigation audit shall be conducted by a certified landscape irrigation auditor prior to the final field observation.

(b) A licensed landscape architect or contractor, certified irrigation designer, or other licensed or certified professional in a related field shall conduct a final field observation and shall submit a Certificate of Substantial Completion to the San Bruno Planning and Building Department. The certificate shall specifically indicate that plants were installed as specified, that the irrigation system was installed as designed, and that an irrigation audit has been performed, along with a list of any observed deficiencies. A sample Certificate of Substantial Completion form is attached as Exhibit "C".

IV. PROVISIONS FOR EXISTING LANDSCAPES

With the exception to any new or rehabilitated landscaping and irrigation systems (as described in Section III. A.), these Water Efficient Landscape and Irrigation Guidelines shall not be applicable to existing project landscaping and irrigation systems in the City of San Bruno.

V. PUBLIC INFORMATION

Attached as Exhibit "E" is a Source List of various books, publications and articles pertaining to landscaping, water conserving plants and irrigation systems. Some of these publications are available in the San Bruno Public Library, while others may be purchased directly from the publishers.